

Multiple Angle Equations

Often, equations involve expressions like $\sin 2x$, $\cos 3\alpha$, or $\tan(x/2)$, all of which involve multiples of the variable rather than a single variable. To solve these equations, we solve for the multiple variable just as we would solve for a single variable and then multiply or divide to get the single variable in the last step.

Example: Find all solutions in degrees to $\sin 2\alpha = \sqrt{3}/2$.

Example: Find all solutions to $\tan(4x) = 1$ in the interval $(0, \pi)$.

Example: Find all real number solutions to $\cos(x/2) = \sqrt{3}/2$.

Example: Find all solutions to $\csc(2x) = 2\sqrt{3}/3$ in the interval $(0^\circ, 360^\circ)$.

Example: Find the exact solutions of the equation $\cos\left(2x - \frac{\pi}{3}\right) = \frac{1}{2}$, in the interval $[0, 2\pi)$.